ABSTRACT

A downlink telemetry system providing improved apparatus and methods for communicating instructions via pressure pulses from surface equipment to a downhole assembly. The apparatus comprises a surface transmitter for generating pressure pulses, a control system, and a downhole receiver for receiving and decoding pulses.

In operation, a bypass valve is opened and closed to create a series of pressure pulses received and decoded by a downhole receiver. The method significantly reduces the time required for downlink communication without interrupting drilling and without interrupting uplink communications such that simultaneous, bi-directional communication is achievable if the uplink and downlink signals are sent at different frequencies.

The telemetry scheme and algorithm provide an inventive method for filtering and decoding the downlink signals. The algorithm determines the time intervals between pulse peaks and decodes the intervals into an instruction. The algorithm also includes error checking for verifying that the instruction was properly received downhole.